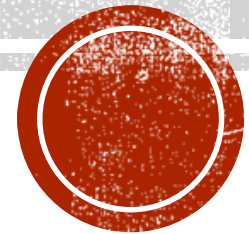# REDDIT CLASSIFICATION WITH NLP
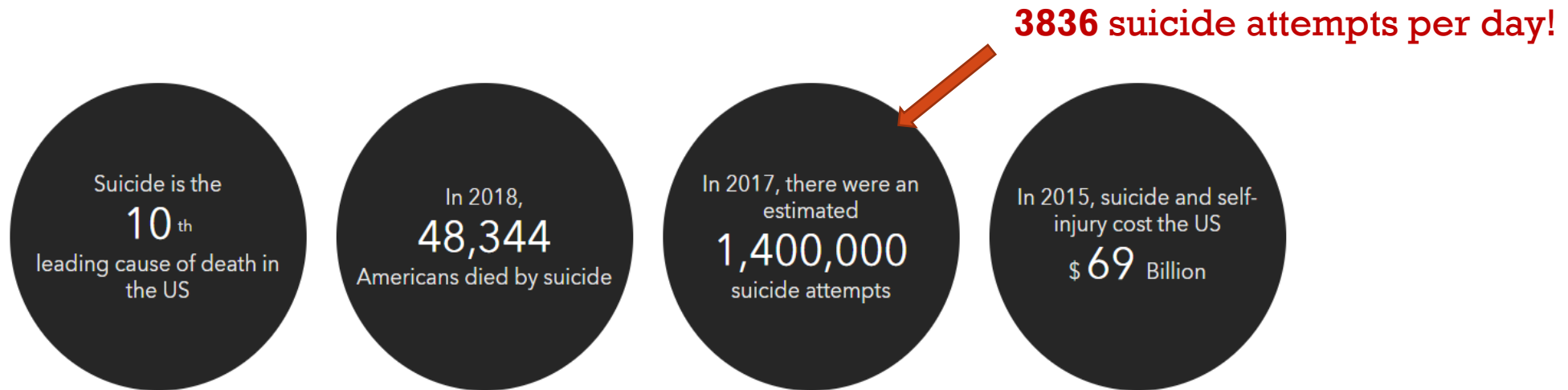
Depression_help vs SuicideWatch

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PROBLEM STATEMENT

- To create a NLP classifier that hopefully can distinguish someone with suicidal intents from depression by analyzing the words they say.

3836 suicide attempts per day!

Suicide is the
10th
leading cause of death in the US

In 2018,
48,344
Americans died by suicide

In 2017, there were an estimated
1,400,000
suicide attempts

In 2015, suicide and self-injury cost the US
$ **69** Billion

Source: American foundation for Suicide Prevention

- Suicide prevention is one way to combat the problem

SUBREDDITS

- **Reddit** is an American social news aggregation, web content rating, and discussion website. Registered members submit content to the site such as links, text posts, and images, which are then voted up or down by other members.

- Posts are organized by subject into user-created boards called "subreddits".

- According to Alexa Internet, as of July 2019, Reddit ranks as the No. 5 most visited website in the U.S. and No. 13 in the world.

- Subreddit "SuicideWatch" has 179K members, while "depression_help" has 47.3K members.

- As their names suggest, these two subreddits are platforms where users with depression or suicidal thoughts could use to seek help. Texts from these two subreddits form the dataset of this classifier project.

MOST MENTIONED WORDS

Depression_help

SuicideWatch

Tough task for the classifiers to distinguish the two subreddits

EDA - DEPRESSION_HELP

Columns	Meaning
subreddit	Subreddit name
title	Title of the post
selftext	Content of the post
Ups	number of up votes by reader
created	Unix epoch time. It is the number of seconds that have elapsed since the Unix epoch, that is the time 00:00:00 UTC on 1 January 1970, minus leap seconds.
created_utc	Unix epoch time which is in UTC and local unix time.
author_flair_text	An indicator of moderator's posts
distinguished	a setting that moderator can choose for his/her message
stickied	Mods can highlight a post by making it a sticky. It's then always the top post on the subreddit's frontpage, independent of votes and time since posting.
num_crossposts	how many times the post is reposted elsewhere
crosspost_parent_list	Details of the original post
crosspost_parent	username of the parent (i.e. the original post)
media	Video, URL

DATA CLEANUP

1. Drop duplicates

2. Remove posts that are not relevant (messages from Moderators, offering helps, etc)

3. Remove crossposts

But…

PD. DROP_DUPLICATES() INEFFECTIVE ON POSTS LIKE BELOW

- Can't remove duplicate completely if the post contents are not 100% same.

```
df.loc[145]['selftext']
```

'Please take my Music Therapy survey! I need responses for my AP Research class. Also if you know anyone who's also willing to take this survey, it will be greatly appreciated.\nhttps://docs.google.com/forms/d/e/1FAIpQLSdeWQZjwM75JCxIbkM9q2hEFmTbhxGUIgGoaL0OgPxP9hXMOA/viewform?usp=sf_link'

```
df.loc[158]['selftext']
```

'Please take my Music Therapy Survey! I need responses for my AP Research class. Also if you know anyone who is willing to do it, it would be greatly appreciated.\nhttps://docs.google.com/forms/d/e/1FAIpQLSdeWQZjwM75JCxIbkM9q2hEFmTbhxGUIgGoaL0OgPxP9hXMOA/viewform?usp=sf_link'

SUBREDDIT: DEPRESSION_HELP
NOT ALL POSTS ARE SEEKING HELP

```
df.link_flair_text.astype(str).value_counts() value_counts(normalize=True)
```

REQUESTING ADVICE	388	0.393110
REQUESTING SUPPORT	227	0.229990
nan	117	0.118541
RANT	91	0.092199
OTHER	32	0.032421
STORY	32	0.032421
PROVIDING SUPPORT	28	0.028369
PROVIDING ADVICE	24	0.024316
INSPIRATION	23	0.023303
MOTIVATION	21	0.021277
OTHER - CALL FOR RESOURCES?	1	0.001013
STORY/ADVICE/MOTIVATION	1	0.001013
is this normal	1	0.001013
uni gives me the heevie jeebies	1	0.001013
Name: link_flair_text, dtype: int64		loat64

WRONG CLASSIFICATION

Human…

	title	selftext	link_flair_text
21	Help I don't know what to do	I have 2 semesters left in college and I've be...	PROVIDING SUPPORT
68	Anyone if anyone is suffering from depression ...	NaN	PROVIDING SUPPORT
99	Suicidal thoughts? ** PLEASE WATCH THIS VIDEO ...	NaN	PROVIDING SUPPORT
118	Tips to Cope with Depression: A Novice's Guide...	For context I'm a 25F in a highly developed ci...	PROVIDING SUPPORT
151	A community for us	Hey guys you may have seen posts from me befor...	PROVIDING SUPPORT

	title	selftext	link_flair_text
226	If any of you fuckers think someone is faking ...	People at my school go around saying people li...	PROVIDING ADVICE

```
df.loc[226]['selftext']
```

'People at my school go around saying people like me are "faking depression" be
cause it's the "cool new thing". Nobody wants to be depressed you fuckin dick h
eads. All you cunts are doing when you tell them that they're faking it is incr
easing the chances they are just gonna tie a noose in their basement and hand t
hemselves. So fuckin stop if you do that\n\nThis is a rant/providing advice'

CROSSPOST

CROSSPOSTING IS WHEN SOMETHING IS FIRST POSTED IN ONE SUBREDDIT, THEN POSTED TO ANOTHER.

⤴ Crossposted by u/Obscura616 4 days ago

3

What is going on here?

REQUESTING ADVICE

r/dating · Posted by u/Obscura616 5 days ago

Girl who ghosted me replied to me again after a month   Tinder/Online Dating

Went on 4 dates with a girl I met on a dating app then on the last date she started to fade away throught text replying with short anwers, taking longer than she use to, also not texting 1st.When I text her saying hey are you not interested anymore if it is that let me know but left me on read.Little info she is 10 years older than me, Im 23 male,she said she likes younger guys also said she wanted a relationship but the way she was acting kept making me believe she wanted sex, cause she sent me nudes without me asking on our 1st videocall she teased me,on the dates she kept talking about sex,on the 3rd date she mention that she wanted to see my penis in flaccid state while I was in her

⤴ Crossposted by u/cassandraSoul 1 month ago

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Sorry if this is too long..

REQUESTING ADVICE

r/depression · Posted by u/cassandraSoul 1 month ago

I'm sorry if this is too long..

This is sort of like my final thoughts. The last place I can think of to go. I know my problems run deep, and that I won't be able to say anything here.. or that.. I may not.. get results.. here.. I love all my friends (even though it's truly difficult for me to show emotion.) and would do anything I can for them.. but hanging out with one of them on Christmas yesterdayhas brought up an old, terrible feeling I seem to get more and more often these days. I, like 1 of my 2 best frienda, am a serious creator. I draw, Roleplay, write books, watch anime and play videogames. I would imagine since I have friends that do the same we could have so much to talk about all the time, which I love doing (especially if it's my own creations).. but.. It never happens. Hist like yesterday it feels like no interest is ever really taken in me. My friends and the group are never talking about the same anime I've watched, the movies I've seen, the games I've played, and so on. This means I rarely have things to
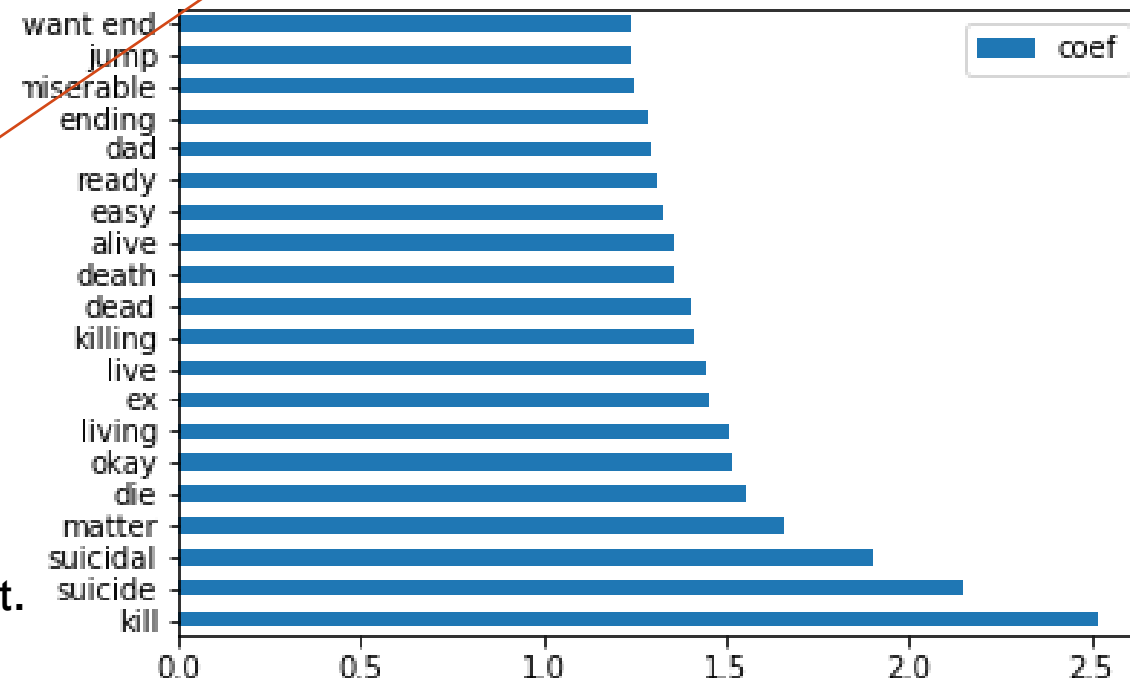
13 crossposts were removed from the dataset

MODELLING RESULTS

Coefficients of LogisticRegression

No.	Model	Train Accuracy	Test Accuracy	f1_score	recall	Specificity
1.	CVec + LogReg	0.82	0.77	0.79	0.85	0.68
2.	TfidfVec + LogReg	0.83	0.77	0.78	0.76	0.79
3.	CVec + NB	0.84	0.80	0.81	0.81	0.78
4.	TfidfVec + NB	0.84	0.77	0.80	0.82	0.72

1. Overfitted
2. Both models only scored in the 77%-80% test accuracy, which means that our models can't accurately predict a post.

The positive is "SuicideWatch". In this case, as our goal is to prevent suicide, **recall** (or **sensitivity**) is used to evaluate the models, which means we'd like to minimize false negative (i.e. avoiding scenario when someone with suicidal thoughts is incorrectly predicted as just having depression, hence a miss case).
→ best model: Logistic Regression with CountVectorizer

RECOMMENDATION AND CONCLUSION

▪ None of the models generalize well. The best model using Countervectorizer and LogisticRegression only has 77% of accuracy and 85% of sensitivity after optimizing both vectorizer and the model. This can be explained by the similar contents, the high overlaps of the words seen in both subreddits.

▪ In order to have better results, other classifiers such as SVM or Random Forest could be explored.

▪ Although the classifier can't predict a SuicideWatch post accurately, there are a few takeaway points that can summarized from the project:

   1. If someone mentions words like "suicide", "suicidal" or "kill", or "die" in a post, we shouldn't ignore the potential of suicidal intention, for very obvious reasons.

   2. A suicidal person tends to say things like "doesn't matter", or "it's okay" in his post, which is the exact opposite of the situation.

   3. A suicidal person also seems to mention "ex" and "dad" - as I'm not a domain expert in psychology, but it's natural to guess that father has some sort of influence, and relationship could be one of the reasons of suicides. This can be verified with the domain experts.